REMARKS

In the aforementioned Office Action, claims 1-48 are pending. Claims 10-14 and 18-47 are withdrawn from consideration, and claims 1-9, 15-17, and 48 are rejected. In view of the following remarks, Applicants hereby respectfully request reconsideration of the Application.

Rejection under 35 U.S.C. § 102

In the last paragraph on page 2 of the Office Action, the Examiner rejected claim 1 under 35 U.S.C. § 102(e) as being anticipated by Chiang et al. (U.S. Patent No. 5,957,846), Barabash et al. (U.S. Patent No. 6,138,513), Smith et al. (U.S. Patent No. 5,744,898), and Lorraine et al. (U.S. Patent No. 5,559,388). More specifically, the Examiner contends that Chiang et al., Barabash et al., Smith et al., and Lorraine et al. disclose "a cableless coupling assembly," as claimed. Applicants respectfully traverse.

Applicants disclose a cableless coupling 203 (FIG. 2) comprising an intermediate structure 204 (FIGS. 2-3), an electrically conducting structure 206 (FIG. 2), and a connector 208 (FIGS. 2-3; page 11, lines 5-7). In one embodiment, the electrical conducting structure 206 is configured as an array of electrical pads 304 (FIG. 3) of any conducting material, and the intermediate structure 204 is configured as intermediate elements 306 (FIG. 3; page 13, lines 7-11). The intermediate elements 306 may be comprised of either an electrically anisotropic conducting media or an electrically isotropic conducting media (page 17, lines 8-10, and page 18, lines 5-7).

Applicants are amending claim 1. Amended claim 1 recites, in part, "a cableless coupling assembly, **the cableless coupling assembly comprising intermediate elements coupled to electrical pads,**" (emphasis added).

In contrast, Chiang et al. discloses, col. 34, lines 21-23, that "array 802 is connected by cable 808 or **wireless connection** to a body worn housing 804," (emphasis added). Applicants respectively submit that Chiang et al.'s wireless connection is not the same as the Applicants' claimed cableless coupling assembly comprising intermediate elements coupled to electrical pads. In fact, Chiang et al. does not disclose any cableless coupling assembly, and furthermore, Chiang et al.'s "wireless connection" is most likely a reference to a wireless cellular link or a wireless communication channel. That is,

Chiang et al. states, in reference to the FIG. 4 functional block diagram of the ultrasound imaging system 10 of FIG. 3, "[t]he transmission channel can be a modem or wireless cellular communication channel ..." (col. 14, lines 61-62). Applicants submit that Chiang et al. does not disclose "a cableless coupling assembly comprising intermediate elements coupled to electrical pads," as claimed.

Barabash et al. discloses a scanner design (FIG. 3d) where a cable 30 (FIG. 3c) for connection with a personal computer 29 (FIG. 3d) is absent. Barabash et al. states, col. 8, lines 33-36, "[t]his connection is made by a wireless communication using transmitter and receiver 33 placed in the handle of the transducer and transmitter and receiver 34 placed near the personal computer." Although Barabash et al. discloses "wireless communication," Barabash et al. does not disclose a "cableless coupling assembly comprising intermediate elements coupled to electrical pads," as claimed.

Smith et al. states, col. 4, lines 35-37, "it is an object of the present invention to provide an ultrasonic transducer assembly which **reduces** the number of cables required," (emphasis added). That is, Smith et al. does not disclose a "cableless coupling assembly," as claimed, but in contrast discloses a transducer assembly with a reduced number of cables. For example, Smith et al. discloses that by using a multi-layer piezoelectric structure as illustrated by the FIG. 15 embodiment of scanner architecture, the total number of coaxial cables is reduced to L+K (col. 16, lines 52-62).

In conjunction with FIG. 1, Lorraine et al. discloses a backfill layer 16 "for preventing ultrasonic energy from being transmitted or reflected from behind the piezoelectric elements 12 of the phased array 14" (col. 3, lines 21-23). With regard to coupling Lorraine et al.'s transmitter 20 (FIG. 1) and receiver 22 (FIG. 1) to Lorraine et al.'s piezoelectric elements 12, Lorraine et al. states, col. 3, lines 40-42, "[a] transmitter 20 controlled by a controller 31 applies a voltage to the plurality of piezoelectric elements 12 of the phased array 14," and col. 3, lines 55-57, "[a]s the echoes of ultrasonic beam energy strike the piezoelectric elements, a voltage signal is generated and sent to a receiver 22." Applicants respectfully submit that Lorraine et al. does not disclose "an ultrasound transducing assembly coupled via the cableless coupling assembly to the signal generating and receiving unit," as claimed. That is, Lorraine et al.'s backfill layer 16 does not couple the piezoelectric elements 12 to the transmitter 20 or the receiver 22. Voltage

signals generated by the transmitter 20 are applied directly to the piezoelectric elements 12, and voltage signals generated by the piezoelectric elements 12 are sent directly to the receiver 22. More specifically, Lorraine et al. does not use the backfill layer 16 to couple the transmitter 20 and the receiver 22 to the piezoelectric elements 12 for signal propagation.

Based at least upon the above remarks, Applicants respectfully submit that amended claim 1 is not anticipated by Chiang et al., Barabash et al., Smith et al., or Lorraine et al., and request that claim 1 be allowed.

Rejection under 35 U.S.C. § 103

On page 3, second paragraph of the Office Action, the Examiner rejected claims 2-4, 6-9, and 15-17 under 35 U.S.C. § 103(a) as being unpatentable over Kunkel (U.S. Patent No. 5,648,942) alone or further in view of Gilmore (U.S. Patent No. 6,043,590) or Smith et al. Applicants respectfully traverse.

With regard to claim 2, the Examiner states, page 3, second paragraph, "Kunkel teaches providing a combined acoustic isolation-intrinsically conductive post assembly 12 to an ultrasound imaging array." In addition, on page 3, second paragraph, the Examiner contends that Kunkel's printed-board to cable arguably meets the claim limitation of "coupling," as in "a signal generating and receiving unit **coupled** via the acoustically isolating assembly to the acoustic transducing elements," as claimed (emphasis added).

Applicants are amending claim 2. Applicants are replacing the phrase "a signal generating and receiving unit coupled via the acoustically isolating assembly to the acoustic transducing elements," with the phrase "a signal generating and receiving unit connected to the acoustically isolating assembly." Applicants submit that claim 2, as amended, recites no new matter. For example, the specification states, page 12, lines 6-8, "[c]onnector 208 ... may be an integral part of signal generating and receiving unit 210." Thus, as illustrated in FIG. 2, the signal generating and receiving unit 210 is connected to the acoustically isolating assembly, comprised of at least the intermediate structure 204 and the electrically conducting structure 206.

In contrast, Kunkel discloses that wires from a cable may be attached to the through-plated holes 54 (FIG. 4) of the printed-circuit board 50 (FIG. 4) to complete electrical attachments to the piezoelectric elements (i.e., to the piezoelectric bar 60) of the array. Kunkel does not disclose a signal generating and receiving unit. That is, Kunkel does not disclose that the printed circuit board 50 comprises signal-processing functionalities, such as signal generation, for example.

Gilmore discloses, col. 2, lines 58-62, a flex circuit 20 (FIG. 1) formed of a sheet 28 (FIG. 1) of nonconductive material with conductive traces 22 (FIG. 1). Gilmore states, col. 2, line 67 – col. 3, line 4, "[a]t their proximal ends ... the conductive traces can be connected to electrical circuitry ... such as transducer drivers, receivers, tuning elements, or multiplexers." Thus, Applicants submit that Gilmore's flex circuit 20 is not a signal generating and receiving unit, as claimed.

Furthermore, Applicants submit that Smith et al. does not disclose "a signal generating and receiving unit connected to the acoustically isolating assembly," as claimed. In contrast, Smith et al. discloses a multi-layer ceramic technology to increase spacing between electrical connections for coupling an integrated circuit to a ceramic connector 520 (col. 16, lines 11-17). That is, Smith et al.'s system includes a first redistribution layer 580, a first conductive layer 581, a second redistribution layer 585, and a second conductive layer 586 for expanding the distance between the connector pads 525 of the ceramic connector 520 (i.e., distance between the transducer elements 560) to desired distances between the connector output pads 590 (col. 14, line 64 – col. 15, line 42). Smith et al., states, col. 15, lines 5-7, "[t]he increased spacing allows for the use of coaxial connections between the transducer array and the external electronics ...."

Although Smith et al. does disclose an integrated circuit mounted onto the connection side of the multi-layer ceramic connector (i.e., to the connector output pads 590), Applicants submit that Smith et al. does not disclose that the integrated circuit is a signal generating and receiving unit. Furthermore, Applicants submit that even if the integrated circuit is a signal generating and receiving unit, although the Applicants contend that it is not, the integrated circuit is not **connected** to an acoustically isolating assembly. For example, Smith et al.'s integrated circuit is **coupled** to a mismatch layer 510 (i.e., an acoustically isolating assembly) via a multi-layer electrical redistribution

system (i.e., a first redistribution layer 580, a first conductive layer 581, a second redistribution layer 585, a second conductive layer, and metallized vias connecting the layers) and a ceramic connector 520.

Based at least upon the above arguments, Applicants submit that amended claim 2 is not obvious in view of the cited references, alone or in combination, and respectfully request that claim 2 be allowed. Furthermore, since claims 3-9 depend either directly or indirectly from amended claim 2, Applicants submit that claims 3-9 are not obvious over the cited references for at least the same reasons given in conjunction with amended claim 2, and request that claims 3-9 be allowed.

With regard to claim 15, the Examiner states, page 4, first paragraph, "[a]n acoustic window ... is essential ... in order to transmit the ultrasound out of the device. See also Smith et al fig. 5 discussion and claim discussions (sic) supra."
Independent claim 15 recites, in part,

> ... acoustic transducing elements that include an acoustically active material between two electrical contacts, an acoustic matching assembly coupled to one of the two electrical contacts, and an acoustic window coupled to the acoustic matching assembly ....

In contrast, Smith et al. discloses a piezoelectric chip 530 (FIG. 14) connected to an electrically conductive layer 510 (FIG. 14) (also referred to as a mismatching layer) on one side, and connected to a second electrically conducting layer 540 (FIG. 14) (also referred to as a matching layer) on the other side (col. 13, lines 19-60). Smith et al. also discloses a stand-off 100 (FIG. 5), which the Examiner equates to an acoustic window. However, Applicants submit that Smith et al. does not disclose "an acoustic matching assembly coupled to one of the two electrical contacts," as claimed. That is, Smith et al. discloses only one layer (i.e., the matching layer 540) connecting to the piezoelectric chip 530 and to the stand-off 100. Smith et al. does not disclose at least two distinct elements, such as an acoustic matching assembly and an electrical contact, in which the acoustic matching assembly is coupled to one of the two electrical contacts, and an acoustic window is coupled to the acoustic matching assembly, as claimed. In addition, Applicants submit that neither Kunkel nor Gilmore, alone or in combination, remedy the

deficiencies of Smith et al. Based at least upon the above arguments, Applicants submit that claim 15 is not obvious over the cited references, and request that claim 15 be allowed.

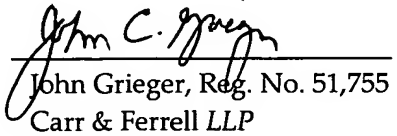
Furthermore, since claims 16-17 depend directly from claim 15, Applicants submit that claims 16-17 are not obvious over the cited references for at least the same reasons given in conjunction with claim 15, and request that claims 16-17 be allowed.

With regard to claim 48, the Examiner states, page 4, third paragraph, "Kunkel alone meets a 'coupling' but not a cableless relationship to the T/R circuitry as discussed above." In response, Applicants are amending claim 48. Applicants request that amended claim 48 be allowed, based at least upon the reasons given above in conjunction with amended claim 2.

Based on the foregoing remarks, Applicants believe that the rejections in the Office Action of October 22, 2003 are fully overcome, and that the Application is in condition for allowance. If the Examiner has questions regarding the case, the Examiner is invited to contact Applicants' undersigned representative at the number given below.

Respectfully submitted,

Umit Tarakci et al.

Date: **January 16, 2004** By: 

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